Epitomes

Important Advances in Clinical Medicine

Chest Diseases

The Scientific Board of the California Medical Association presents the following inventory of items of progress in chest diseases. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist busy practitioners, students, research workers, or scholars to stay abreast of these items of progress in chest diseases that have recently achieved a substantial degree of authoritative acceptance, whether in their own field of special interest or another.

The items of progress listed below were selected by the Advisory Panel to the Section on Chest Diseases of the California Medical Association, and the summaries were prepared under its direction.

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Inhaled Treatment of Asthma

THE TOPICAL DELIVERY OF METERED-DOSE INHALER (MDI) drugs is currently regarded as optimal for the treatment of asthma. The standard dosages of most agents are two to four puffs from an MDI three or four times a day, whereas inhalant solutions of bronchodilators are usually given in dosages that may be ten times as large. Recently there has been a trend towards using an appropriately increased number of puffs of an MDI (usually with a spacer added) for emergency department and inpatient therapy for acute asthma in place of jet-nebulizer aerosolization.

The increasing death rate of asthmatic patients has led to concerns about the role of sympathomimetic aerosols. In New Zealand, the potent aerosol bronchodilator, fenoterol, has been cited as potentially hazardous, but no other MDI preparation has been implicated. Recently airway reactions to the use of metaproterenol sulfate (Alupent) MDI were found to be the result of a change in the adjuvant, and this problem has been resolved by restoring the original formulation.

Corticosteroids are used by some authorities to provide cornerstone therapy for the inflammatory changes that characterize asthma. The appropriate doses and number of treatments a day for various MDI products are controversial, however. It is probable that increased dosage would be effective in some persons with asthma who respond inadequately to standard dosing with inhaled steroids, although the inconvenience and expense are major obstacles. It is claimed that flunisolide is effective if given twice a day, and it is probable that beclomethasone dipropionate and triamcinolone would be equally effective if given twice rather than three or four times a day.

In the outpatient management of asthma, most experts prescribe MDI delivery of a β_2-selective bronchodilator, using increased doses if necessary. A spacer can be advantageous, but some patients prefer the new inhaled powder form of albuterol. A steroid MDI with a spacer can be added, but considerable individual experimenting may be needed to establish the optimal dosing for each patient. Younger patients may benefit from using cromolyn sodium and older ones with a component of chronic obstructive pulmonary disease should try ipratropium bromide. Oral therapy in patients with chronic asthma has a secondary role, but an oral agent should be introduced—choosing from slow-release theophylline or albuterol, or prednisone—if the aerosol regimen becomes too complex or demanding. For a competent adult patient, there is no justification for prescribing a powered nebulizer or an exotic aerosol drug delivery system to be used at home.

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Lasers in Pulmonary Treatment

IN THE PAST DECADE lasers have been developed for the treatment of tracheobronchial obstruction. Evidence gathered by many investigators indicates that the neodymium-YAG [yttrium-aluminum-garnet] laser is most helpful in providing rapid and safe palliative relief of obstructed large airways—trachea, main stem, and lobar bronchi—due to intraluminal benign or malignant lesions. Laser therapy may provide palliative relief in an asphyxiating patient for whom no therapeutic alternative previously existed.

The electromagnetic or photon energy of lasers is absorbed by tissues and dissipated as heat-causing destruction. In the case of the neodymium-YAG laser, energy is transmitted through a thin, flexible quartz fiber that easily passes through the biopsy channel of a flexible or rigid bronchoscope. The procedure is done in an operating department or its equivalent under full anesthetic control, preferably through a ventilating rigid bronchoscope, and generally requires less than two hours of operating time and two days' stay in a hospital.

Those intraluminal lesions that are most technically responsive are short, polypoid, and only partially obstruct a major airway. Alternatively, extensive or predominantly peribronchial (extraluminal) lesions as detected by bronchoscopy and chest computed tomography are not easily palliated.

Most symptomatic patients who require laser treatment have primary or metastatic lung cancer that has recurred or cannot be controlled despite previous or concurrent surgical therapy, radiation therapy, or chemotherapy. In selected cases, however, patients having severe dyspnea, wheezing,

stridor, cough, hemoptysis, or unresolved pneumonia or atelectasis may require immediate initial laser treatment because of life-threatening symptoms associated with a benign or malignant lesion in a major airway. Symptomatic relief from asphyxiation in a patient with endobronchial malignancy can be achieved for an average of six months.

Laser therapy is clinically justified for the initial treatment of benign tracheal stenosis due to an outgrowth of a fibrous web or diaphragm in symptomatic patients with severe air flow limitation who have not responded to mechanical dilatation. It can offer excellent palliative relief and in some cases be curative. Optimal results may ultimately require additional surgical resection or a Montgomery tube. Tracheomalacia is not an indication for laser therapy.

We have been impressed with the frequent incidence of malignant or benign lesions of the trachea or main-stem bronchi (or both) in symptomatic patients that go undetected by chest roentgenograms. Chest computed tomography, pulmonary function studies, and bronchoscopy may be necessary in unresolved cases. Current research for the detection of unsuspected endobronchial malignant tumors involves fluorescence imaging using injected hematoporphyrin derivative and krypton ion laser. In addition, photodynamic ablation therapy may be achieved by using an argon-pumped dye laser causing irreversible tissue oxidation.

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Lung Transplantation

NINE YEARS AFTER LUNG TRANSPLANTATION was shown to be feasible in dogs, the first human lung transplantation was done in 1963. In the next two decades, rapid developments in the field of solid organ transplantation took place, but the feasibility of lung transplantation was held back by difficulties with immunosuppression, bronchial healing, and infection. In spite of that, in the mid-1980s successful lung transplantation in humans became a reality in Toronto, Canada, where the first procedure was carried out. Since that time several centers have begun doing both single- and double-lung transplants with excellent results. It is now possible to offer lung transplantation in appropriately selected and treated candidates with a 60% to 70% one-year survival figure. There are several four-, five- and six-year survivors in the lung transplantation program from Toronto. The availability of more selective and powerful immunosuppressive agents including cyclosporine, OKT3, and other monoclonal antibodies is now making appropriate and selective immunosuppression possible. A better understanding of posttransplantation infection with advances in the diagnostic techniques has led to the rapid recognition of these infections and their treatment, leading to better results.

Current indications for single-lung transplantation vary slightly from center to center. At the moment, common indications for single-lung transplantation include pulmonary fibrosis, pulmonary emphysema from whatever cause, Eisenmenger's syndrome with simple intracardiac defects, and primary pulmonary hypertension. Double-lung transplantation is indicated in patients who have end-stage bilateral septic disease and thus require replacement of both lungs to prevent postoperative infection. Such diseases as cystic fibrosis and bronchiectasis are common indications of double-lung transplantation in 1990. The criteria for acceptance into the program include an appropriate psychosocial history and a lack of severe diseases in other organ systems.

Lung transplantation offers several advantages over heart-lung transplantation, but most particularly offers a feasibility of donation that does not occur with the more common and more established heart-lung transplantation. The organ allocation system in the United States provides that when a patient is on the waiting list for a status I heart, the organ will be allocated to that recipient. Because of this, there are frequently hearts donated with the lungs not being used, if only heart-lung recipients are being screened. When a lung transplant patient is on the waiting list, however, the lungs are then usable for that patient. It is possible to obtain from a single donor two single-lung transplant preparations and a heart transplant for a third patient. This has been carried out in several centers throughout the world.

At a recent seminar on lung transplantation, it became apparent that more than 200 lung transplantations have been done worldwide in the past year or two with the survival figures as mentioned. It is obvious that this is no longer an experimental procedure but one that is a therapeutic necessity in many patients who are otherwise condemned. In the future, we will see the indications widen and the procedure being done in many centers in much the same way as the clinical activity in heart and liver transplantation has changed in the past ten years.

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Transtracheal Oxygen Therapy

GIVING SUPPLEMENTAL OXYGEN has been shown to improve survival in persons with chronic obstructive pulmonary disease (COPD) who have significant hypoxemia. In the National Institutes of Health Nocturnal Oxygen Therapy Trial, patients with a Pao_2 of 55 mm of mercury or less (oxygen saturation $\leq$ 88%) when stable or a Pao_2 of 56 to 59 mm of mercury (oxygen saturation of 89%) in association with polycythemia or cor pulmonale were randomly assigned to receive either nocturnal oxygen or continuous oxygen therapy. Those advised to use oxygen continuously actually used it an average of 19 hours per day and lived considerably longer than those using oxygen only at night. Oxygen therapy can also enhance the exercise capacity in persons with hypoxemia.

Administering oxygen through a nasal cannula (nasal prongs) has been the conventional mode of delivery in outpatients, but the delivery of oxygen through a transtracheal catheter was reported almost a decade ago. Initial concerns that transtracheal catheters would commonly become infected and cause chronic irritation have not been confirmed. The advantages of the transtracheal administration of oxygen over that of a nasal cannula include eliminating